

**CLAIMS**

1. A method for determining an order of at least two labeled unit specific markers of a polymer comprising,

obtaining polymer dependent impulses for at least two labeled unit specific markers of a plurality of polymers,

comparing the polymer dependent impulses obtained from each of the plurality of polymers,

determining an order of the at least two labeled unit specific markers from the polymers based upon comparing the polymer dependent impulses.

2. The method of claim 1, wherein the plurality of polymers is a homogenous population.

3. The method of claim 1, wherein the polymer dependent impulses arise from unit specific markers of less than all units of the polymers.

4. The method of claim 1, wherein the polymers are randomly labeled.

5. The method of claim 3, wherein the polymer dependent impulses arise from at least two unit specific markers of the polymers.

6. The method of claims 1, wherein the polymer is a nucleic acid.

7. The method of claim 6, wherein the obtained polymer dependent impulses includes the time of separation between unit specific markers.

8. The method of claim 6, wherein the unit specific markers are nucleic acid probes.

9. The method of claim 8, wherein the unit specific markers are two base pair nucleic acid probes.

10. The method of claim 8 wherein the unit specific markers are three base pair nucleic acid probes.

11. The method of claim 6, wherein the unit specific markers are peptide nucleic acid probes.

12. The method of claim 6, wherein the obtained polymer dependent impulses indicate the sequence of units of the polymer.

13. The method of claim 1, wherein a portion of the unit specific markers are unknown.

14. The method of claim 1, wherein each polymer is analyzed separately.

15. A method for sequencing a polymer of linked units comprising,

obtaining polymer dependent impulses from a plurality of overlapping polymers, at least a portion of each of the polymers having a sequence of linked units identical to the other of the polymers, and

comparing the polymer dependent impulses from an overlapping portion of each of the plurality of polymers to obtain a sequence of linked units which is identical in the plurality of polymers.

16. The method of claim 15, wherein the polymer dependent impulses are optically detectable.

17. The method of claim 15, wherein the plurality of polymers is a homogeneous population.

18. The method of claim 15, wherein the plurality of polymers is a heterogeneous population.

19. The method of claim 15, wherein the plurality of polymers is randomly labeled.

20. The method of claims 15, wherein the polymers are nucleic acids.

21. The method of claim 20, wherein the nucleic acids are labeled with an agent selected from the group consisting of an electromagnetic radiation source, a quenching source and a fluorescence excitation source.

22. The method of claim 15, wherein each polymer is analyzed separately.

23. A kit for labeling polymers, comprising:

a container housing a series of distinct nucleic acid probes; wherein the series of nucleic acid probes is a set of multiple base pair probes.

24. The kit of claim 23, wherein the multiple base pair probes are selected from the group consisting of two base pair probes, three base pair probes, four base pair probes, and five base pair probes.

25. The kit of claim 23, wherein the container is a single container having a plurality of compartments, each housing a specific labeled probe.

26. The kit of claim 23, wherein the container is a plurality of containers each containing a multiple base pair probe having a different sequence.

27. The kit of claim 23, further comprising instructions for labeling the nucleic acid probes.

28. The kit of claim 23, wherein the distinct nucleic acid probes are labeled.

29. The kit of claim 23, wherein the distinct nucleic acid probes are two base pair probes.

30. The kit of claim 23, wherein the distinct nucleic acid probes are three base pair probes.

5 31. The kit of claim 23, wherein the distinct nucleic acid probes are four base pair probes.

32. The kit of claim 23, wherein the distinct nucleic acid probes are five base pair probes.

10 33. A method for analyzing a polymer, comprising  
linearly moving a labeled polymer with respect to a fixed station,  
obtaining a signal from the labeled polymer as the labeled polymer passes the fixed  
station, wherein the signal is an electromagnetic radiation signal arising from an interaction  
between at least two distinct labeled unit specific markers,

15 34. The method of claim 33, wherein each unit of the labeled polymer is labeled and  
the quantitative measure of intensity of the signal indicates the length of the polymer.

35. The method of claim 33, wherein less than all units of the polymer are labeled  
with at least one unit specific marker and the quantitative measure of intensity of the signal  
indicates the number of labeled unit specific markers present in the polymer.

20 36. The method of claim 33, wherein the fixed station is an electromagnetic radiation  
source.

37. The method of claim 33, wherein the fixed station is a radiation source.

25 38. The method of claim 33, wherein a plurality of polymers are analyzed  
simultaneously to produce a plurality of signals, one signal for each polymer, and further  
comprising the step of comparing the intensities of the signals to analyze the polymers.

39. The method of claim 33, wherein a plurality of polymers are analyzed  
simultaneously to produce a signal.

30 40. The method of claim 39, wherein the number of polymers is known and wherein  
each of the polymers is "identically labeled and further comprising the step of dividing the  
intensity labeled and further comprising the step of dividing the intensity by the number of  
polymers to determine the number of labeled unit specific markers in each polymer.

41. The method of claim 33, wherein the units are labeled with a peptide nucleic acid probe.

42. The method of claim 33, wherein the units are labeled with a series of distinct nucleic acid probes selected from the group consisting of two base pair probes, three base pair probes, four base pair probes, and five base pair probes.

43. The method of claim 33, wherein the units are labeled with a fluorescent probe.

44. The method of claim 33, wherein the labeled polymer is labeled with a plurality of unit specific markers, wherein at least one unit specific marker includes a fluorophore which emits light at a first wavelength and at least one unit specific marker which includes a fluorophore which emits light at a second wavelength

45. The method of claim 44 wherein the at least one unit specific marker which includes the fluorophore which emits light at the first wavelength is attached to end units of the polymer and wherein the at least one unit specific marker which includes the fluorophore which emits light at the second wavelength is attached to an internal unit of the polymer.

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